Title	Teaching problem solving: Views of science teachers in Singapore primary schools
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Teaching Problem solving
Views of Science Teachers in Singapore Primary Schools *

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Abstract
Problem solving and thinking skills have recently been highlighted in the Singapore press and in the education circles. There is renewed interest to promote more independent thinking among Singapore pupils, starting from primary schools. A study among science teachers was carried out in the middle of 1996. The aim of the study was to find out if science teachers were adopting the teaching of problem solving in the national primary science curriculum and if so, what were the teachers' perception of the teaching approach using problem solving. This paper is a preliminary report of a part of the study. It provides information on the instructional situation in primary science lessons and the factors that influenced the teachers to adopt certain instructional techniques, in particular, a problem-solving approach in teaching primary science.

Introduction

A major goal of science education is science education programmes have been the development of thinking skills and in particular problem solving (Lavoie, 1993). Yet many teachers do not accept problem solving as a teaching approach (Appleton, 1995). Bransford (1984) advocates that problem solving can be learned. He thinks that problem solving frequently is not learned because it is not frequently taught.

The Director of Education, Ministry of Education, Singapore said that "teachers can help students to reason, question and enquire". He believed that teachers played a pivotal role in helping students to take a bold leap from learning facts to thinking about issues and problems (Yip, 1993 address at the Principals' Conference).

Science teachers should use a variety of methods to teach science to cater to the different learning styles of children in the Primary Science Syllabus. It is also set out that science is not just a body of knowledge of the physical world, but also a method of inquiry which utilizes a series of intellectual and process skills. It is believed that science in primary schools also aims to develop in pupils positive attitudes which are characterized by being curious, persistent, caring and capable of thinking critically and creatively (page 7 of the Primary Science Syllabus, 1994)

Castillo (1978) comments that one of the factors which seems to influence science, is the movement from rural living to urban living. The science curricula should urge teachers to provide learning environments that allow students to find the important ideas themselves, explore the environment and their ideas as thoroughly as they are able to do things for themselves. Guidance should be given to enable students to ask questions and then seek answers, both by following the procedures described in the texts and by formulating hypothesis using information they have acquired from previous life experiences. Questions and experiences are suggested which will help the students to test the validity of their hypothesis.

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Science educators have stressed the importance of students developing science process skills, especially thinking skills through the process of problem-solving in suitable learning environments. Equipped with good, thinking skills, the individuals will better be able to meet the modern challenges posed in the 21st century.

A study was recently carried out among science teachers in Singapore primary schools in the middle of 1996. The main aim of the study was to investigate the teachers' understanding of their roles as science teachers and the extent to which they used the problem-solving approach in the teaching of primary science.

This paper reports on a part of the study. The paper will focus on the science instructional techniques that teachers used in primary schools and the factors that determined teacher's choice of using different instructional techniques in teaching primary science. The relevant research questions pertaining to the paper are as follows :
To what extent are the problem solving activities carried out in the instructional situation in
a primary science classroom?
What are the factors that influence the teachers' decision to implement the problem-solving
teaching approach?

The national primary science syllabus in Singapore, namely "The Primary Science Syllabus" provides the framework and guidelines and sets the tone of the science curriculum in Singapore Government primary schools. One of the aims of the Primary Science Syllabus includes enabling pupils to develop skills and attitudes necessary for scientific inquiry and problem solving. Developing thinking skills and problem-solving abilities starts at a young age.

Problem-solving Instructional Model
There are different proposed instructional models for problem-solving. Bransford (1984) came up with the IDEAL model for the process of problem solving. Pizzinni, Shepardson and Abell (1989) proposed an instructional model for problem-solving called the SSCS.

The SSCS model is appropriate for classroom use. The first phase (S) is the search phase. It involves students in generating and refining problems or researchable questions. The second phase (S) is the solve phase. During the solve phase, the students identify potential questions and investigate the research question by preparing and implementing their plan of action. The plan includes designing their own method of data collection, implementing their own plan, and collecting and analyzing their own data. The third phase (C) is the create phase where students design a means to communicate the question or problem, methodology, results and conclusions. The fourth phase (S) involves students in presenting their information to an audience which may be other students.

Method
The study adopted the survey method. The instrument used in the survey was a questionnaire, namely the "Use of Science Instructional Techniques. The profile of the teachers in the sample and the design of the instrument are discussed.

Sample
The sample comprised of 348 teachers from 35 schools in Singapore. The schools were selected at random. The sample consisted of 70 (20%) male teachers and 278 female teachers. The principal of each school was asked to select about ten teachers to participate in the study. The female teachers made up of the majority of the participants as the number of female teachers outnumbered that of male teachers in the Singapore Government Service (Singapore Yearbook of Statistics, 1995). It was suggested to the school principals that the teachers who were selected to participate in the study, have at least three years of teaching experience and that he/she had taught science during the last five years, from 1991 to 1996.

In the study, it was considered that three years of teaching experience were long enough for a science teacher in a primary school to gain experience and confidence in the subject. The national primary science syllabus, the Primary Science Syllabus, was reviewed and was first implemented in primary schools in early 1990s. As such the study focused on teachers who had taught science using the new Primary Science Syllabus from 1991 to 1996.

There was a wide range of the age of the teachers, from early 20s to late 50s. The highest percentage of the teachers came from the 40 to 49 age bracket (Table 1). The average number of years of teaching experience was 19.9 years (Table 2). Among the teachers, the number of years teaching science at the lower primary level (namely, at Primary 3 and 4) since 1991 and the number of years teaching science at the upper primary level (namely Primary 5 and 6) are shown in Table 3.

Most of the teachers had attained educational qualifications at either Advanced Level (39.7%) or at Ordinary Level (37.9%). Some of the teachers had University degrees or higher (12.4 %). The educational qualifications of the teachers are shown in Table 4. The teachers were asked to indicate the science courses in their educational

qualifications. 75.3% of the teachers said that they had attended science courses. Details on the teachers' science educational qualification are shown in Table 5.

Table 1 : Age-range of the teachers

Age-range	Percentage of sample
Less than 25 years	8.9
25 to 30 years	13.8
30 to 35 years	13.2
35 to 40 years	11.2
40 to 50 years	28.4
50 years and above	19.3

Table 2 : Number of years of teaching

Number of years of teaching	Percentage of sample
Less than 5 years	25.3
5 to 10 years	9.5
10 to 15 years	9.5
15 to 20 years	7.5
20 to 25 years	8.0
25 to 30 years	10.1
More than 30 years	27.6

Table 3 : Number of years of teaching science at lower and upper primary levels from 1991 to 1996.

Number of years	Science at Low Prim Levels	Science at Up Prim Levels
0	32.2	12.4
1	22.4	11.5
2	15.5	11.8
3	12.4	7.5
4	6.6	6.9
5	6.6	12.1
6	4.3	26.1
7 and above	-	11.8

Table 4 : Profile of the teachers by educational qualifications

Educational qualification	Percentage of the sample
Ordinary Level (O Level)	37.9
Advanced Level (A Level)	39.7
Diploma	9.2
University and above	12.4

Table 5 : Science educational qualifications of the teachers

Level	Biology(%)	Chem(%)	Physics(%)	Combined Science (%)
No quals	52.6	64.4	65.2	65.5
Less than O Lev	2.9	2.3	2.3	2.9
Ordinary Level (`O' Level)	32.8	20.1	17.2	26.4
Advd(`A' Level)	7.5	8.0	10.6	4.9
`AO' Level	1.1	1.1	2.6	0
Diploma	0.3	0.3	0.3	4.9
Uni and above	2.9	3.7	1.7	0

Instrument

Pilot Study

A pilot study was carried out in early March 1996, which was about two months before the actual survey. The purpose of the pilot study was to refine the items in the questionnaire, namely the "Use of Science Instructional Techniques". A sample of 18 teachers, which consisted of 15 females and 3 males in a Singapore Government primary school, were asked to write down their views to the following open-ended questions :

(1) What do you perceive in your role as a teacher of primary science?

What do you wish to see developed in your pupils after they have

attended
your science lessons?
(3) What are the typical activities conducted during your science lessons?
(4) Other than the prescribed CDIS (Curriculum Development Institute of Singapore) textbooks and materials, what other resources do you use, and how often do you use them?
(5) Other comments that you may have regarding the teaching of primary science.

In the pilot study, each of the teachers had two or more than two years of teaching experience. The teachers had also taught primary science during 1991 to 1996. The researcher tried to collect comments from teachers who had different years of teaching experience, ranging from two years to 20 years.

The questionnaire was adapted from the one used in a study by Chin, Goh, Chia, Lee and Soh (1994). Based on the comments received from the pilot study, some of the items that were used by Chin et al (1994) were re-written for a better focus. There were additional items such as the section on the teacher's tasks which fall outside of the classroom teaching.

The sample in the 1994 study consisted of 100 pre-service teachers who were second-year students taking the Diploma in Education programme with the School of Science at the National Institute of Education. Chin et al (1994) developed the questionnaire to measure the pre-service teachers' use of the problem-solving teaching approach in the teaching of science in primary schools. Chin et al, (page 8 of her report) said that the instrument was first developed from Lawrenze (1990) in a survey of science teaching techniques associated with higher order thinking skills and from Harty, Kloosterman and Matkin (1991) in the survey of the use of a problem-solving approach in elementary science classes.

Design of the questionnaire

The aim of the questionnaire was to find out the instructional techniques that teachers use to teach science in the primary schools, and the factors that affect the use of the techniques. There were a total of 90 items in the nine-paged questionnaire. The questionnaire comprised of six sections. Section One covered the personal particulars of the teacher. Section Two asked for the teachers' views on their roles in teaching science. Section Three investigated the instructional situation in terms of the pupils' tasks, the nature of question and problem in the science investigation and the time spent on various activities. Section Four was an open-ended section, requiring the teachers to write their ideas on problem solving in teaching and learning science. Section Five was about the teachers' views on teaching problem solving. Section Six asked for information on the factors that influenced the teachers whether to adopt a problem-solving approach in teaching science.

The data from Sections Three and Six helped to answer the two research questions set out in the preceding paragraphs of this paper. The sections are further elaborated. The purpose of the Section Three was to find out more about the instructional situation in the following three areas: (A) Pupils' tasks; (B) Nature of the problem and questions in science investigation and (C) Time spent on various activities. There were 13 statements in subsection A, 15 in subsection B and 17 questions in subsection C. The teacher was asked to indicate his/her agreement on a five-point Likert scale, namely, 1 - almost never, 2 - seldom (once in several weeks), 3 - sometimes (about once in a fortnight), 4 - often (about once a week) and 5 - always (almost every lesson). The purpose of Section Six was to find out the factors that could influence the science teacher whether to adopt a problem-solving approach in teaching science. There were 16 items. The teacher was asked to respond a "Yes" or a "No" to the items. There was a space for the teacher to write his/her views for each item.

Procedure

Copies of the refined questionnaire were printed and distributed to the schools by the researcher and some lecturers from the National Institute of Education who acted as contacts. 500 copies of questionnaire were distributed and 348 copies were returned (69.8% response rate). This was considered an acceptable response rate by the author.

The schools were given about two weeks to complete the ten questionnaires each. The questionnaires were then collected. The data was then analysed. The statistics programme that was used to handle the quantitative data from all the sections except Section Four of the questionnaire, was the Statistical Package for the Social Science (SPSS, 1993). The programme provided statistical analysis and data management.

In the questionnaire, the majority of the items were statements that were worded positively but there were some which were worded negatively. There were a total of 13 negative items. Scoring for the items were reversed. The negative items were found in the following sections:
Items 3 and 4 in the Section Three, Subsection B : Nature and questions in science
investigation;
Item 5 in Section Five : Teacher's views about teaching problem solving; and
Items 1, 2, 3, 6, 7, 8, 9, 11, 12 and 15 in Section Six : Factors that affect science instruction.

Results

The reliabilities of the subscales of the questionnaire are reported. The response distribution of the teachers to the items of the questionnaire are given in the relevant tables.

Reliability

The reliabilities of the subscales of the questionnaire and of the total questionnaire were determined by Cronbach's alpha method. In Section Three of the questionnaire, the 13-item subscale on the pupils' tasks yielded a reliability index of 0.87; the 15-item subscale on the nature of the problem and question in the science investigation had a reliability index of 0.73 and the 17-item subscale on time spent on various activities had an index of 0.80. For Section Six, the 16-item subscale on the factors that affect science instruction had a reliability index of 0.48. The reliability index of the total scale of the questionnaire (excluding section one which asked for personal particulars of the teachers) was found to be 0.88.

The instructional situation

Tables 6, 7 and 8 show three aspects of the instructional situation. Table 6 shows the pupils' tasks, Table 7 the nature of the problem and question in the science investigation, and Table 8 shows the time spent on various activities. All the three tables showed the percentage response distribution to the items.

Table 6 : The pupils' tasks
When engaged in the science activities, the pupils :

Item	AN(1)	SE(2)	ST(3)	OF(4)	AL(5)	Mean	Std Dev
1 carry out specific activities from the workbook or teacher's worksheet.	0	0.3	4.3	44.0	51.1	4.45	0.64
2 identify a researchable question or problem themselves.	6.6	19.3	42.5	27.3	3.2	2.98	0.99
3 list as many questions as possible about a topic in the given opportunity.	5.7	22.4	35.3	28.4	7.2	3.06	1.05
4 follow detailed instructions to perform the activity or experiment.	0.9	4.3	11.8	46.8	36.2	4.13	0.85
5 design an experiment with little or no assistance.	14.1	31.3	32.5	19.0	2.3	2.62	1.05
6 identify appropriate apparatus and resources for their practical activities.	5.2	11.2	32.8	33.6	16.7	3.44	1.09
7 form hypotheses about the outcomes before carrying out the activities.	5.2	11.5	34.8	37.6	10.6	3.36	1.01
8 perform experiments to verify previously taught concepts	4.9	14.1	31.6	35.9	12.6	3.35	1.08
9 perform experiments to demonstrate concepts.	2.0	4.6	21.6	50.6	20.7	3.82	0.92
10 interpret results of their experiments.	0.6	1.7	14.4	52.3	30.2	4.07	0.84
11 make a presentation of their question,							

method, data and conclusion.
7.5 14.4 37.6 29.3 10.6 3.20 1.09
12 work in small co-operative groups.
0 2.9 15.5 44.5 37.1 4.16 0.79
13 ask questions for procedural clarification.
2.0 10.1 29.9 37.1 21.0 3.65 0.99

Notes :
(a) Abbreviations used in the Table 6 :
1 = AN = Almost never
2 = SE = Seldom (once in several weeks)
3 = ST = Sometimes (about once in a fortnight) 4 = OF = Often (about once a week)
5 = AL = Always (almost every lesson) Std Dev = Standard Deviation
(b) Mean scores were based on a scale of 1= Almost Never (AN) to 5 = Always (AL)

From Table 6, items 1, 4, 8, 9, 10, 12 and 13 focused on activities that were general in nature. The teachers felt that pupils often (about once carried out activities that were general such as doing worksheets and follow the procedure of experiments. Items 2, 3, 5, 6, 7, 10, 11, 12 and 13 were considered as activities that were more of problem-solving in nature. Tasks that involved problem solving seemed to be conducted sometimes (about once in a fortnight), relatively less frequent. Tasks that pertained specifically to problem solving included designing experiments with little or no assistance from the teacher, identifying appropriate apparatus and forming hypotheses about the outcomes before carrying out the activities.

Table 7shows the response distribution (%) of the nature of the problem or question in the science investigation.

Table 7 : The nature of the problem or question in the science investigation

Item	AN(1)	SE(2)	ST(3)	OF(4)	AL(5)	Mean	Std Dev
1 The problem is posed by the pupils with some help from the teacher.	9.8	20.1	46.3	20.7	2.6	2.85	0.97
2 The problem is posed by the teacher.	0.6	3.4	19.5	55.7	20.4	3.91	0.79
3 The problem and question have no obvious answers. *	1.4	12.4	41.7	25.3	17.5	3.39	1.07
4 The answer is not always known. *	1.1	11.2	36.8	28.4	21.6	3.56	1.04
5 The problem has only one correct answer.	6.0	20.4	48.6	21.8	2.3	2.91	0.91
6 The problem has more than one possible answer.	0.9	12.1	46.3	36.8	3.2	3.27	0.81
7 The problem varies from the workbook or the teacher's answer sheet.	10.1	16.1	44.3	24.4	4.0	2.93	1.03
8 The problem requires more than one step to reach the solution.	2.0	7.2	41.7	42.2	5.5	3.38	0.89
9 The problem requires the pupils to make critical comments on a suggested solution.	3.2	18.1	43.4	29.3	4.3	3.09	0.96
10 The pupils decide on the method used to solve the problem.	7.8	20.7	48.3	19.8	1.7	2.81	0.95
11 The solution requires knowledge of the definitions of concepts.	0.6	4.3	31.6	52.0	10.1	3.62	0.86
12 The solutions requires simple recall of specific information.	1.4	4.9	33.6	48.9	10.3	3.59	0.86
13 The solution requires the application of concepts to novel situations.	1.7	7.5	34.2	46.0	9.2	3.49	0.93
14 The solution to the problem requires the use of tabular or graphical data.	4.6	23.6	50.0	18.4	1.4	2.83	0.90
15 The solution requires the pupils to give their reasoning.	0.6	2.9	27.0	53.2	15.2	3.76	0.85

Notes
(a) * The scoring for items 3 and 4 were reversed as they were negative statements.
(b) Abbreviations used in Table 7 :
1 = AN = Almost never
2 = SE = Seldom
3 = ST = Sometimes
4 = OF = Often
5 = AL = Always
Std Dev = Standard Deviation
(c) Mean scores are based on a scale of 1=Almost Never (AN) to 5 = Always (AL)

The items 3, 4, 5 and 6 of Table 7 were on the perception of the problem/question in science investigations. The teachers perceived that the problem/question in the science investigation sometimes had no obvious answer or no known answer or had only one correct answer or had more than one possible answer.

Items 1, 2, 7, 9 and 10 identified the source of the problem/question set in the investigation. It was perceived that it was often the teacher who posed the problem/question in the science investigation (item 2) and sometimes it was posed by pupils with some help from the teacher (item 1). The problem/question sometimes varied from the teacher's worksheet or the prescribed workbook (item 7). Items 9 and 10 were on decisions on the methods used in the science investigation. It was found that sometimes pupils made critical comments on the suggested solution and that sometimes they decided on the method used to solve the problem/question in the science investigation.

Items 8, 9, 10, 11, 12, 13, 14 and 15 sought information on the nature of the solution in the science investigation. From items 11, 12 and 13, teachers often perceived that the problem/question required application of knowledge and concepts such as simple recall of information. Items 8, 9, 14 and 15 are about steps in the science investigation that are particular to the problem solving process. Sometimes the solution required the use of tabular or graphical data (item 15). The solution often required pupils' reasoning (item 15).

Table 8 shows the response distribution (%) of the time spent on various activities in a science classroom.

Table 8 : Time spent on various activities

Item	AN(1)	SE(2)	ST(3)	OF(4)	AL(5)	Mean	Std Dev
1 Explanation of concepts.	0	1.1	9.5	44.3	43.4	4.25	0.89
2 Demonstration by teacher.	0.6	7.2	36.5	45.4	9.2	3.52	0.87
3 Discussion by pupils.	0.6	3.7	26.7	46.0	21.8	3.81	0.92
4 Hands-on activities or experiments.	0	0.9	13.5	55.7	29.6	4.13	0.70
5 Completion of workbook or worksheets.	0	0.6	8.0	34.2	56.9	4.46	0.72
6 Reading textbook.	3.2	13.2	29.0	30.2	23.3	3.54	1.14
7 Watching videotapes and use of other audio-visual materials on related topic.	2.6	17.2	46.0	28.2	5.5	3.15	0.90
8 Spelling quiz or class test.	1.7	23.9	43.4	25.3	5.2	3.07	0.90
9 Going into the computer laboratories for Computer-Based Learning (CBL) lessons on the related science topic.	61.5	13.8	12.9	4.9	2.6	1.60	1.09
10 Group work on project.	6.6	26.1	29.0	29.0	8.3	3.04	1.11
11 Visit the Ecology garden or other areas of the school for the purpose of examining certain specimens.	6.0	26.7	39.1	20.1	6.0	2.87	1.06
12 Other activities.	2.9	9.8	8.3	4.6	0.9	0.70	1.28
13 My science teaching is geared towards teaching problem solving.	0.6	10.1	40.5	41.1	6.3	3.38	0.88
14 My pupils spend time on activities that foster problem -solving skills.	0.9	10.3	43.4	38.2	6.3	3.36	0.85

15	The activities in the science workbook promote problem solving and the development of higher-order skills.	0.6	8.6	38.8	42.2	7.8	3.42	0.92
16	I make use of activities beyond the school's recommended text and workbook.	6.0	25.9	45.7	17.0	4.6	2.86	0.96
17	The activities that I planned promote problem solving and development of higher-order thinking skills.	4.0	17.0	45.4	29.0	3.7	3.09	0.92

Notes
(a) Abbreviations used in Table 8 :
1 = AN = Almost never
2 = SE = Seldom (once in several weeks)
3 = ST = Sometimes (about once in a fortnight)
4 = OF = Often (about once a week)
5 = AL = Always (almost every lesson)
Std Dev = Standard Deviation
(b) Mean scores are based on a scale of 1= Almost Never (AN) to 5 =Always (AL)

From the table 8, the completion of the workbook or worksheets always took up most of the time in the science classroom (item 5). The other activities that were conducted often included the explanation of concepts, demonstration by teacher, discussion by pupils, hands-on activities and the reading of the textbook (items 1, 2, 3, 4, and 6). Other activities that were conducted at some of the times included spelling quizzes, watching audio-visual shows, group work on project and field trips to other parts of the school such as the school's ecology garden (items 7, 8, 10 and 11).

The teachers believed that their teaching was sometimes geared towards problem solving and the development of higher order thinking skills (items 13,14 and 17). The teachers felt that the activities in the science classroom sometimes promoted problem solving (item 15). They sometimes made use of activities beyond the school's recommended textbook and workbook (item 16).

Factors that affect science instruction
Table 9 shows the response distribution (%) of the teacher's perception of factors that affected their teaching science using a problem-solving approach.

Table 9 : Factors that affect science instruction

Item		Yes (1)	No (2)	Mean	Std Dev
1	Sure of how to use a problem-solving approach. *	64.7	27.6	1.20	0.03
2	Sufficient formal background in science. *	63.5	34.2	1.32	0.03
3	Feeling adequate about science knowledge. *	65.2	30.7	1.27	0.03
4	Need to maintain control of pupils' learning.	43.7	52.0	1.48	0.03
5	Like things to be definite.	49.1	48.3	1.46	0.03
6	Feel comfortable that unintended outcomes may occur. *	66.1	31.6	1.29	0.03
7	Pupils have the ability. *	39.4	58.0	1.56	0.03
8	Pupils are motivated to learn. *	69.8	27.9	1.26	0.03
9	Problem-solving activities are not time consuming. *	27.0	68.1	1.64	0.03
10	Feel pressurized to first cover content that will be tested in the examinations.	85.1	14.1	1.13	0.02
11	Adequate administrative support. *	61.2	33.9	1.30	0.03
12	Colleagues' advice is that problem- solving is feasible in a science class. *	85.3	11.2	1.08	0.02

13	Physical constraints of classroom or school.	59.5	38.5	1.37	0.03
14	Time-tabling constraints.	68.4	30.2	1.29	0.03
15	Resources are adequate for problem solving.*	44.8	52.0	1.49	0.03
16	Classroom management	21.8	76.1	1.75	0.03

Notes
Items 1, 2, 3, 6, 7, 8, 9, 11, 12, and 15 were negatively worded in the questionnaire. The scoring for the items was reversed.

As the scale for this section was either a YES (1) or a NO (2), the author decided that resulting mean scores that were less than 1.5 would be taken as belonging to "YES", and the scores greater than or equal to 1.5 belonging to "NO".

Items 1, 2, 3, 4, 5 and 6 touched on the teacher's personal characteristics. The teachers felt that they were sure of using a problem solving approach in teaching science (item 1). They also felt that they were not limited by their background in science (item 2) nor did they feel inadequate about the science content knowledge (item 3). The teachers felt that they liked things to be definite but that there was little or no need to maintain control over pupils' learning (items 4, 5 and 6). Items 7 and 8 were on pupils' characteristics. The teachers felt that the pupils were motivated to learn and to some extent, the pupils lacked ability.

The teachers felt that there was a time constraint imposed by the school's timetable and by the pressure to cover the required syllabus for examinations (items 9, 10 and 14). The teachers perceived that they had support from the school administration and their colleagues to include problem solving in the science lesson (items 11 and 12). To a small extent, the teachers agreed that there were not adequate physical facilities and resources for problem-solving activities (items 13 and 15). The teachers felt that class management was a not factor in their decision to use the problem-solving approach in the teaching of science.

Implications
The initial picture of the study seemed to be that science teachers in

Singapore primary schools were aware of the problem-solving approach in teaching science. However, the approach was not frequently used, as indicated by most teachers responding "sometimes" to statements that focused on problem-solving activities. It is positive to note that most primary school science teachers indicated personal confidence in teaching science and felt that they had adequate science background. Among most teachers, two external factors that affected the choice of using problem solving approach in the teaching of primary science were the lack of curriculum time and the pressure of covering the syllabus in time for academic examinations. Science lessons which adopt the problem solving approach will inevitably take more time and in this respect, the curriculum time for science will have to be re-examined. As the findings of study are still in the process of being analysed , a more concrete picture will be seen at a later stage.

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